

That Which Is Claimed:

1. A battery separator comprising
a multi-layered microporous film, individual layers of
said film having been bonded together by heat and pressure, having
a peel strength of greater than 40 grams per inch (1.6 g/mm) and a
thickness of \leq 25 microns.
2. The battery separator of Claim 1 wherein said multi-
layered microporous film being a tri-layered film.
3. The battery separator of Claim 2 wherein said tri-layered
film having a polypropylene-polyethylene-polypropylene structure.
4. The battery separator of Claim 1 wherein said film having
a thickness of less than or equal to 20 microns.
5. The battery separator of Claim 1 wherein said film having
a thickness of less than or equal to 15 microns.
6. A battery separator comprising:
a multi-layered microporous film, individual layers of
said film having been bonded together by heat and pressure, having
a peel strength of greater than 40 grams per inch (1.6 g/mm)

wherein at least one layer being substantially polypropylene, another layer being substantially polyethylene, and the film having a thickness of less than or equal to 15 microns.

7. A method of making a battery separator comprising the steps of:

- extruding and winding up a first precursor film;
- extruding and winding up a second precursor film;
- unwinding the first and second precursor film;
- stacking up the first and second precursor films to form a single stacked precursor;
- laminating the single stacked precursor film;
- winding up the laminated single stacked precursor film;
- stacking up a plurality of laminated single stacked precursor films; and
- making microporous said plurality of laminated single stacked precursor films.

8. The method of Claim 7 wherein extruding the first or second precursor further comprises extruding with a slot die, T die, or a blown film die.

9. The method of Claim 7 wherein the single stacked precursor being a tri-layer precursor.

10. The method of Claim 9 wherein the tri-layer precursor being a polypropylene-polyethylene-polypropylene precursor.

11. The method of Claim 7 wherein laminating being at speeds greater than 100 ft/min (30.5 m/min).

12. The method of Claim 11 wherein laminating being at speeds greater than 125 ft/min (38.1 m/min).

13. The method of Claim 12 wherein laminating being at speeds greater than 150 ft/min (45.7 m/min).

14. The method of Claim 13 wherein laminating being at speeds greater than 200 ft/min (61.0 m/min).

15. The method of Claim 7 wherein laminating being conducted between heated nip rollers.

16. The method of Claim 15 wherein the nip roller temperature ranging from 145°C to 170°C.

17. The method of Claim 16 wherein the nip roller temperature ranges from 155°C to 165°C.

18. The method of Claim 15 wherein the nip roller pressure ranges from 100 to 800 pounds per linear inch (pli).

19. The method of Claim 18 wherein the nip roller pressure ranges from 100 to 300 pli.

20. The method of Claim 7 wherein a chill roll following the nip rollers.

21. The method of Claim 20 wherein the chill roll temperature ranges from 20°C to 45°C.

22. The method of Claim 21 wherein the chill roll temperature ranges from 25°C to 40°C.

23. The method of Claim 20 wherein an air knife being placed between the nip rollers and the chill roll.

24. The method of Claim 20 wherein edge trim knives follow the chill roll.

25. The method of Claim 7 wherein the plurality of laminated single stacked precursor films being at least six laminated single stacked precursor films.

26. The method of Claim 25 wherein the plurality of laminated single stacked precursor films being at least twelve laminated single stacked precursor films.

27. The method of Claim 26 wherein the plurality of laminated single stacked precursor films being at least sixteen laminated single stacked precursor films.

28. The method of Claim 7 wherein making microporous said plurality of laminated single stacked precursor films being selected from the group consisting of a dry process and a wet process.

29. A method of making a battery separator comprising the steps of:

extruding a precursor film,

laminating together two or more precursor films to form a multi-layered precursor film,

stacking up at least twelve multi-layered precursor films, and

making microporous the stacked multi-layered precursor films.

30. The method of claim 29 wherein at least sixteen multi-layered precursor films are stacked up.

31. The method of claim 29 wherein making microporous the stacked multi-layered precursor films being selected from the group consisting of a dry process and a wet process.